10GBASE-T Market Potential & Technical Feasibility on Installed Cabling by 2005

IEEE 10GBASE-T Study Group Prepared by:

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Objective: Demonstrate Simultaneous Technical Feasibility (Capacity) and Broad Market Potential

- **Majority of installed base by 2005 will support 10GBASE-T operation**
- **100% of augmented C6 will support 10GBASE-T operation.**

Method

- **Technical Feasibility:**
  - Use model and parameters per 10GBASE-T study group member contributions
  - Use measured and ad-hoc model data for C5e and C6
  - Calculate capacity for installed base
- **Broad Market Potential:**
  - Use market data (BISRIA per Alan Flatman)
  - Estimate % of existing installs that would provide a minimum of 18 Gbps Shannon capacity

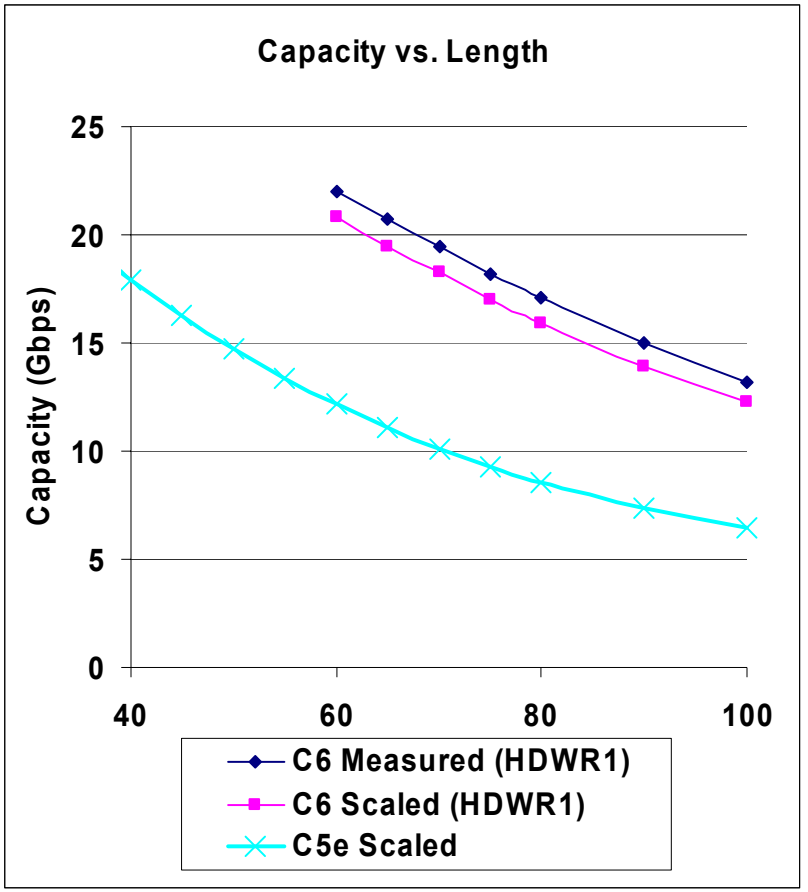
Capacity Calculations:

Model Parameters and Sources

Parameter	Value	Source
Target Capacity	**18 Gbps**	**Ze'ev Roth (Mysticom),**
BKN	**-155 dB/Hz**	**Multi-vendor (Broadcom, Marvel, Vativ)**
Echo Cancellation (RL)	**50 dB**	**Bijit Halder - Telicos (Plato assumed 70 dB)**
NEXT Cancellation	**50 dB**	**Plato (Bijit used both 40dB and 60 dB)**
PSELFEXT Cancellation	**30 dB**	**Plato assumed 50 dB, Telicos assumed 25 dB.**
Max F	**625 MHz**	
Fsym	**833 MHz**	
ANEXT Cancellation	**0 dB**	**No ANEXT cancellation used in baseline calculations.**

Installed Base Capacity Modeling

Length	C6 Measured (HDWR1)	C6 Scaled (HDWR1)	C6 Measured (HDWR2)	C6 Scaled (HDWR2)	C5e Scaled
100	13.22	12.25	11.67	10.98	6.47
90	14.98	13.93	13.4	12.6	7.4
80	17.06	15.92	15.45	14.55	8.58
75	**18.21**	17.04	16.59	15.65	9.3
70	19.43	**18.23**	**17.81**	16.83	10.12
65	20.7	19.5	19.08	**18.08**	11.06
60	22.02	20.83	20.4	19.4	12.14
55					13.36
50					14.74
45					16.25
40					**17.9**
35					19.65
30					21.48
18 Gbps	76 m	71 m	69 m	65 m	40 m



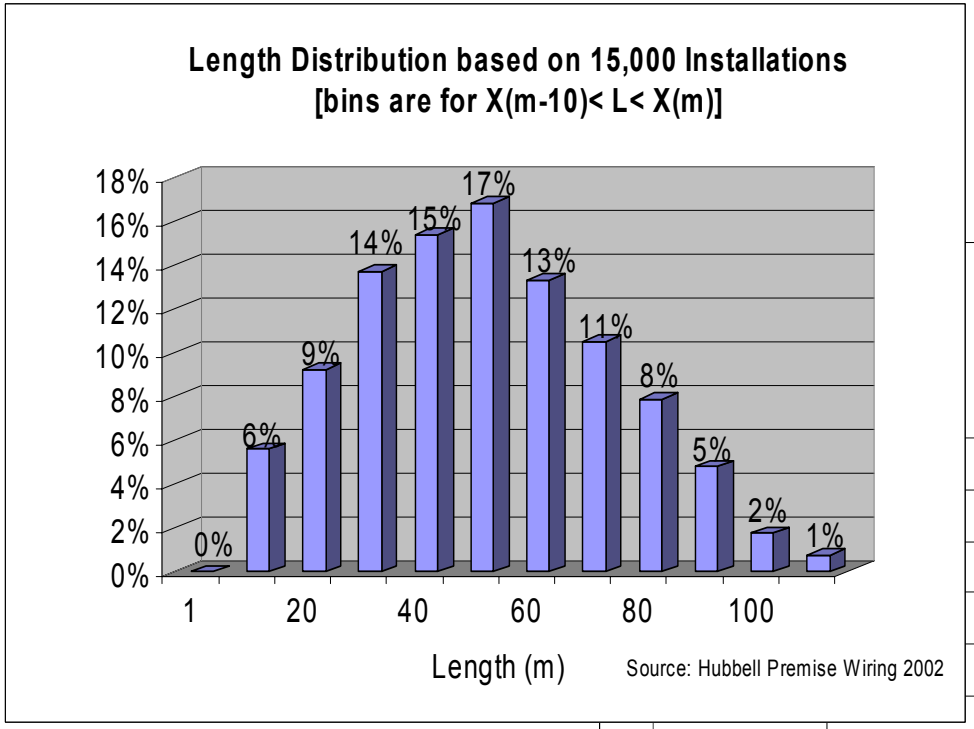
C5e WC Capacity > 18 Gbps for L ≤ 40m

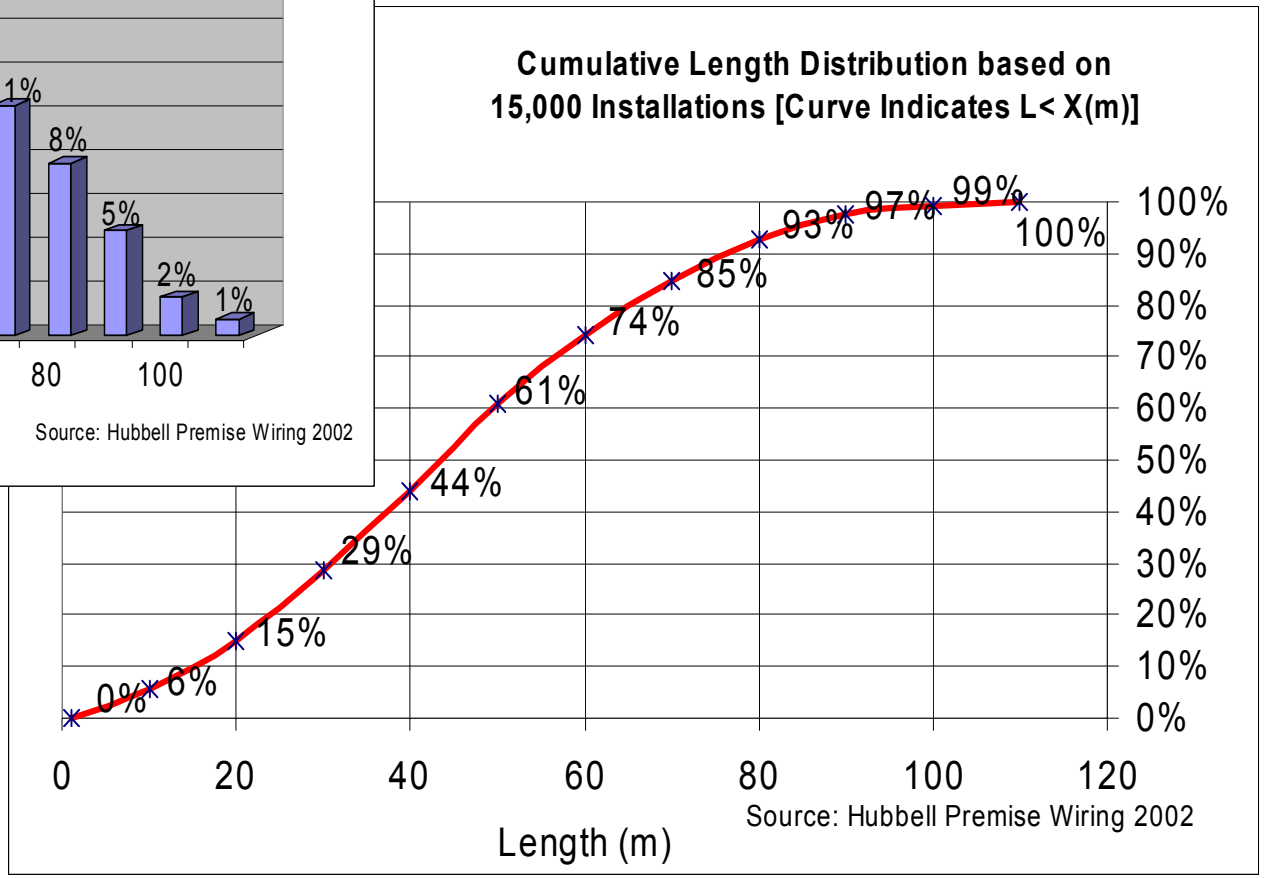
C6 Measured Capacity > 18 Gbps for L ≤ 76m

C6 Scaled Capacity > 18 Gbps for L ≤ 71m

18 Gbps capacity is achievable for lengths of at least 65 m for scaled (worst case) C6

Length Distribution of Installed Base





Market Overview
(Current Projection)

Category	C5		C5e		C6		C7	
	No.	%	No.	%	No.	%	No.	%
Total Installs 2005	138.8	**15.0%**	462.5	**50.0%**	314.5	**34.0%**	3.7	**0.4%**
Supports 10 Gbps (>18 Gbps Capacity)	27.8	**< 20%**	203.5	**44%**	251.6	**80%**	3.7	**100%**

(Numbers from BISRIA per Alan Flatman 03-03 contribution)

NOTE – C5 is not expected to support 10GBASE-T. The number in the table is hypothetical.

Moving Forward – Augment C6

- Supply desired channel capacity model to the cabling industry (TIA, ISO)
- Allow cabling industry to optimize design parameters to support 10GBASE-T with augmented C6
  - Primary tradeoffs are between ANEXT and IL
- DSP assumptions do affect the achievable capacity, especially ELFEXT cancellation

100% of augmented C6 will support 10GBASE-T

Conclusions:

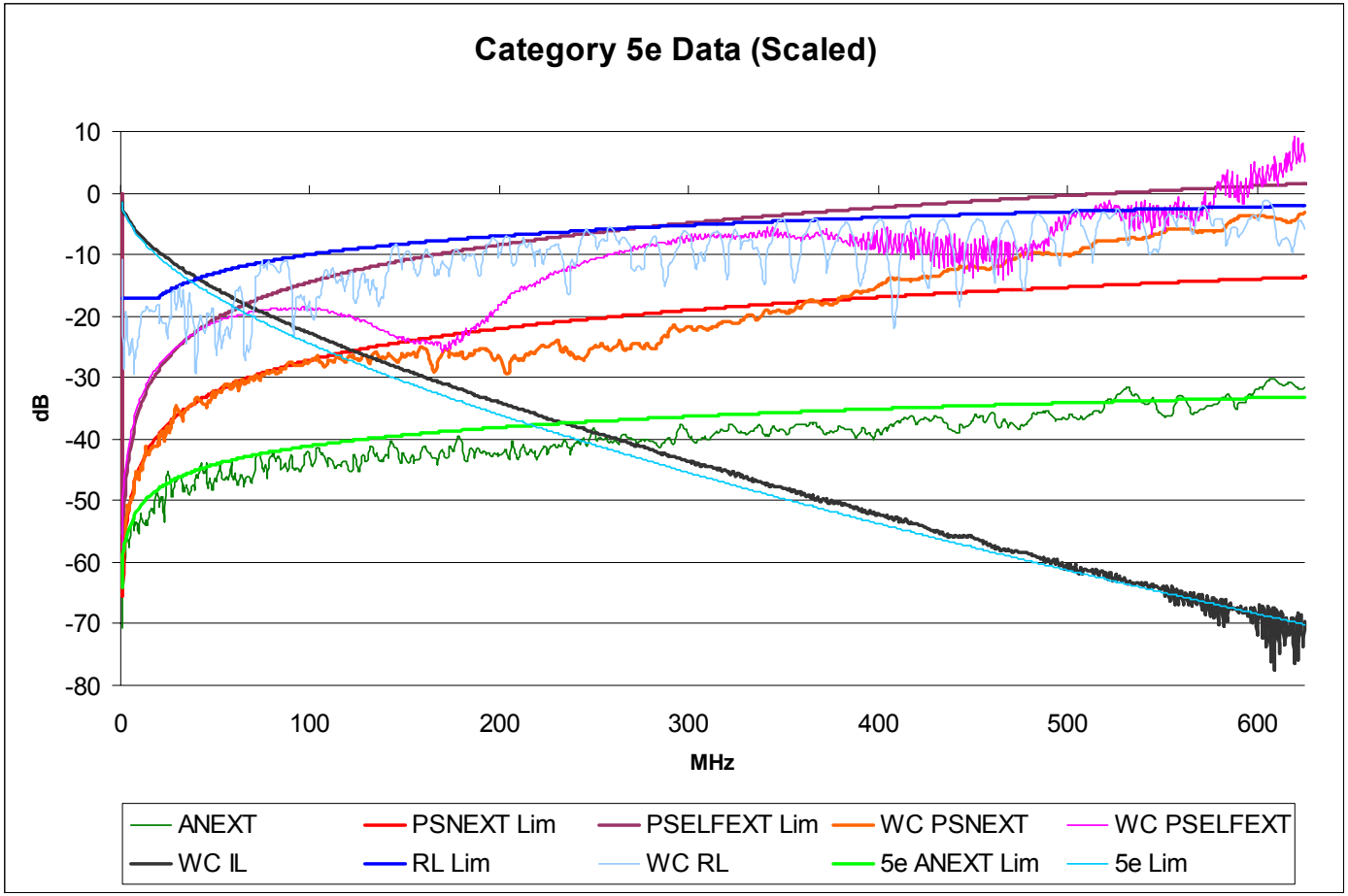
- Technical Feasibility is shown on installed base of C6 (>80%) and C5e (>44%)
- Market Potential is shown on installed base
- Proposal for the objectives:

  10GBASE-T targets operation over
  - at least 44% of category 5e (Class D),
  - at least 80% of Category 6 (Class E),
  - and 100% of augmented Category 6 (Class EEE?) and Category 7 (Class F)

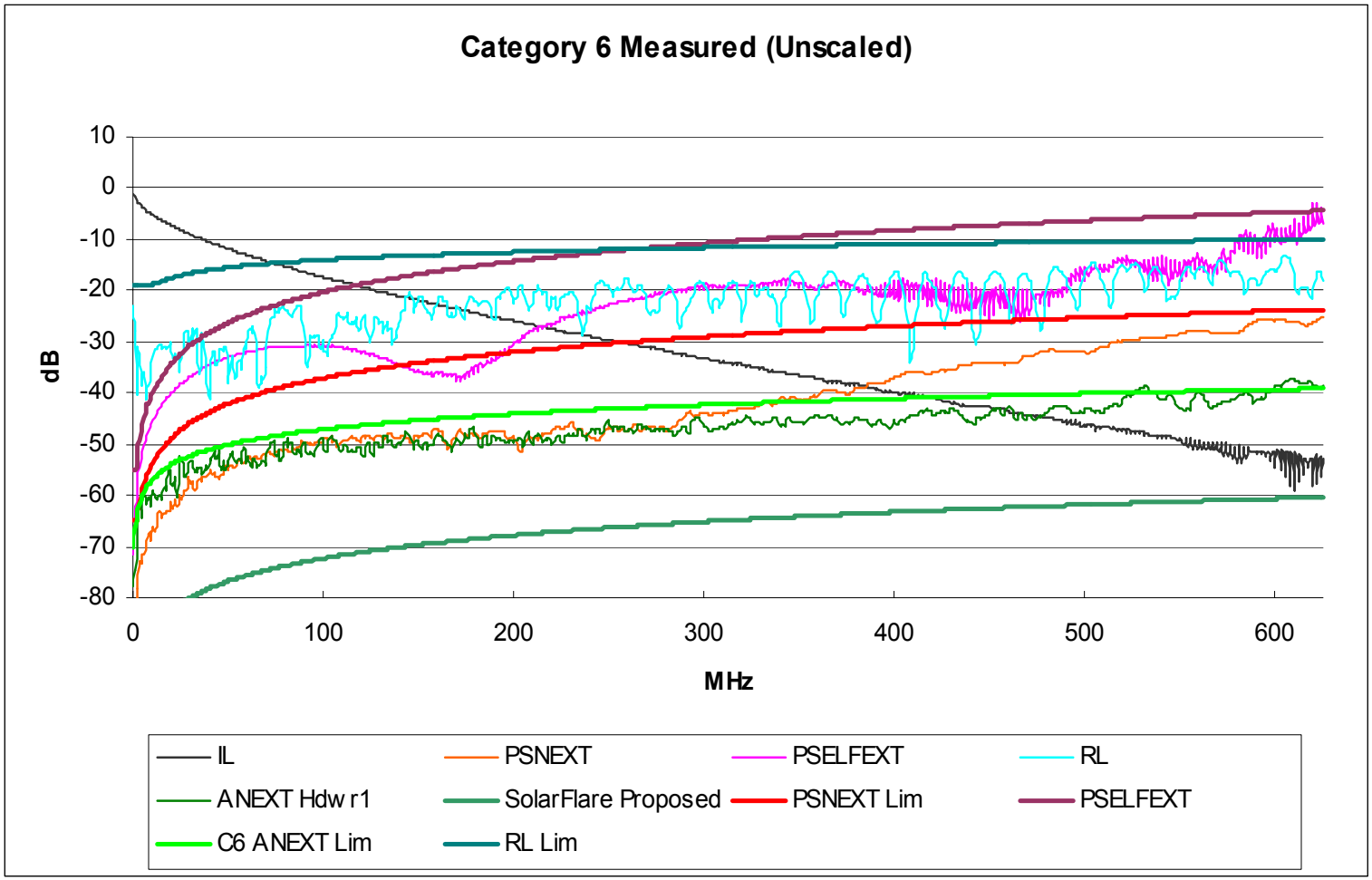
Proposed: Refer to % coverage rather than specific lengths in PAR, criteria, and objectives

Supporting Data

C5e - Scaled



Supporting Data
C6 - Measured



Supporting Data

C6 - Scaled